MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2021/2022

DOS5311 – OPERATING SYSTEMS

(DIT)

12 AUGUST 2022
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 5 pages with 4 Questions only.

2. Attempt ALL questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the Answer Booklet provided.

QUESTION 1 (10 Marks)

A. List and explain any **THREE** of characteristics of **real-time systems**. (3 Marks)

B. Given the memory layout as shown in **Figure 1**, determine the address of base registers and limit registers for Process X and Process Y. (2 Marks)

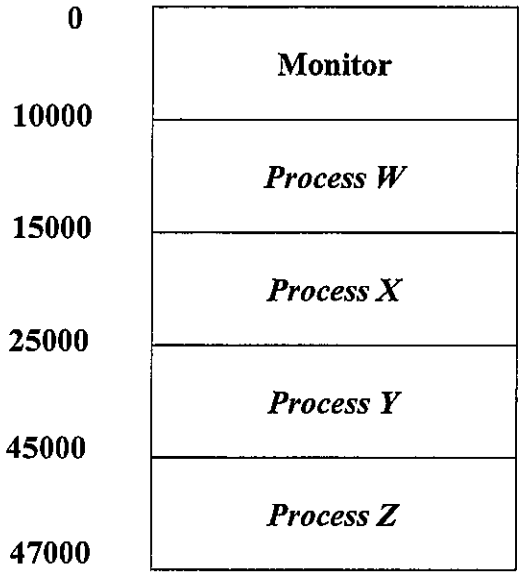

Figure 1: Memory Layout

C. What is **microkernel** operating system? State the main function of microkernel. (2 Marks)

D. While the program is executing, a new process is created. This process can be uniquely characterized by several unique elements. Please list any 6 of them. (3 Marks)

Continued .....

QUESTION 2 (10 Marks)

Table 1 shows the processes with the length of the CPU burst time given in milliseconds. The processes arrived according to the arrival time.

Process	Arrival Time *(ms)*	Burst Time *(ms)*	Priority
P_1	5	11	4
P_2	5	11	2
P_3	3	3	2
P_4	0	6	1
P_5	9	7	3

Table 1: Processes Arrival Time

Draw Gantt Charts illustrating the execution of these process using the following scheduling algorithms. Calculate the ***waiting time*** for each process and the ***average waiting time***.

A. Preemptive Shortest-Job-First (5 Marks)

B. Round Robin (Quantum = 3) (5 Marks)

Continued .....

QUESTION 3 (10 Marks)

Consider a system with four processes P_1, P_2, P_3 and P_4 and three resource types:

Scanner (15 instances), Printer (10 instances), Disk (5 instances).

	Printer		Scanner		Disk	
	Max	**Allocation**	**Max**	**Allocation**	**Max**	**Allocation**
P_1	7	2	0	0	3	0
P_2	5	3	9	5	3	0
P_3	10	3	4	4	0	0
P_4	2	2	0	0	7	2

Table 2: Resources Allocation

Available		
Printer	**Scanner**	**Disk**
5	1	3

Table 3: Resources Available

A. Based on the requirements, current allocations and available resources are given in **Table 2** and **Table 3**. Determine the content of the matrix ***Need***. (4 Marks)

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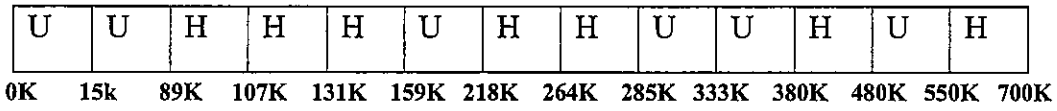
B. Given a heap of memory management scheme with the following free list:



* U - Used
* H - Hole

The following process request will be received in order as in Table 4:

Process Number	Size in Kilobytes
P1	64
P2	30
P3	35
P4	56
P5	20

Table 4: Processes and Size

Show how the memory requests above are allocated using the following memory allocation schemes.

i. Best Fit (BF) (3 Marks)

ii. First Fit (FF) (3 Marks)

Continued .....

QUESTION 4 (10 Marks)

Consider the following page reference string:

s, t, v, x, z, t, s, v, z, s

Assuming a paging scheme with **THREE (3)** frames is initially empty. Trace the allocation of pages to frames and determine the number of *page faults* occur using the following page replacement algorithms:

A. Optimal (3 Marks)

B. First-In-First-Out (FIFO) (3 Marks)

C. State and describe the **FOUR (4)** operations on a file with regards to sequential access method.

(4 Marks)

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